

WHAT IS CLAIMED IS:

1. A method of desalinating or purifying saltwater or otherwise polluted water-to-be-treated via hydrate fractionation, said method comprising:

introducing said water-to-be-treated into a hydrate fractionation column;

injecting a hydrate-forming gas or mixture of gases into said water-to-be-treated under temperature and pressure conditions conducive to the formation of gas hydrate, whereupon said gas or mixture of gases reacts with said water-to-be-treated at a point of hydrate formation to yield gas hydrate and residual fluid while liberating heat of hydrate formation which tends to warm said residual fluid; and

allowing said gas hydrate to rise through said hydrate fractionation column and to enter a hydrate dissociation region in which said gas hydrate dissociates and releases fresh water and said hydrate-forming gas or mixture of gasses;

wherein said method is controlled such that said gas hydrate separates from said residual fluid at or near said point of hydrate formation.

2. The method of claim 1, wherein said gas hydrate collects and condenses in a collection and condensation zone of said hydrate fractionation column that is located above said point of formation and below said hydrate dissociation region.

3. The method of claim 1, wherein said hydrate fractionation column is configured so that fluid is removed from said hydrate fractionation column from a position below said point of hydrate formation, said method comprising controlling flow rates of fluid through said hydrate fractionation column such

that substantially all of said residual fluid flows downward from said point of hydrate formation and out of said hydrate fractionation column at said position below said point of hydrate fractionation.

4. The method of claim 3, wherein said flow rates are controlled such that a region of essentially static fluid exists above said point of hydrate formation and wherein the fluid that is removed from said hydrate fractionation column via said portion below said point of hydrate formation comprises a mixture of residual fluid and water-to-be-treated.

5. The method of claim 3, wherein heat of hydrate formation is carried out of said hydrate fractionation column by means of residual fluid flowing out of said hydrate fractionation column via said portion below said point of hydrate formation.

6. The method of claim 1, further comprising allowing interstitial residual water carried upward with said gas hydrate to flow out of said hydrate fractionation column through vents or other exit means located above said point of hydrate formation and below said dissociation region.

7. The method of claim 6, further comprising flushing said gas hydrate with fresh water or gray water introduced into said hydrate fractionation column at a point above said vents or other exit means.

8. The method of claim 1, further comprising cooling said water-to-be-treated before introducing it into said hydrate fractionation column.

9. The method of claim 8, wherein said water-to-be-treated is cooled by being passed through said dissociation region in heat-exchanging relation with gas hydrate that is dissociating therein.

10. The method of claim 1, further comprising pre-treating said water-to-be-treated before it is introduced into said hydrate fractionation column by

causing said hydrate-forming gas or mixture of gases to be dissolved in said water-to-be-treated under conditions under which hydrate does not form.

11. A method of desalinating or purifying saltwater or otherwise polluted water-to-be-treated via hydrate fractionation, said method comprising:

introducing said water-to-be-treated into a hydrate fractionation column;

injecting a hydrate-forming gas or mixture of gases into said water-to-be-treated under temperature and pressure conditions conducive to the formation of gas hydrate, whereupon said gas or mixture of gases reacts with said water-to-be-treated to yield gas hydrate; and

allowing said gas hydrate to rise through said hydrate fractionation column and to enter a hydrate dissociation region in which said gas hydrate dissociates and releases fresh water and said hydrate-forming gas or mixture of gasses;

said method further comprising pre-treating said water-to-be-treated before it is introduced into said hydrate fractionation column by causing said hydrate-forming gas or mixture of gases to be dissolved in said water-to-be-treated under conditions under which hydrate does not form.

12. The method of claim 11, wherein said hydrate-forming gas or mixture of gases is caused to be dissolved in said water-to-be-treated to saturation.

13. An installation for desalinating or purifying saline or otherwise polluted input water, said installation comprising:

a desalination fractionation installation having a hydrate formation region disposed at a lower portion of said installation and a hydrate dissociation region disposed at an upper portion of said installation;

a mixing chamber;

an input water conduit which is arranged to provide input water to said mixing chamber and to said hydrate formation region;

a gas supply conduit which is arranged to provide hydrate forming gas to said mixing chamber and to said hydrate formation region; and

wherein hydrate forming gas is dissolved into at least a portion of the input water in said mixing chamber prior to being input into said hydrate formation region.

14. The installation as set forth in claim 13, wherein said input water conduit which is arranged to provide input water to said mixing chamber and to said hydrate formation region constitutes a first input water conduit arranged to provide input water to said mixing chamber and a second input water conduit arranged to provide input water to said hydrate formation region.

15. The installation as set forth in claim 13, wherein said gas supply conduit which is arranged to provide hydrate forming gas to said mixing chamber and to said hydrate formation region constitutes a first gas supply conduit arranged to provide hydrate forming gas to said mixing chamber and a second gas supply conduit arranged to provide hydrate forming gas to said hydrate formation region.